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**THE SOUTHERN LAKE MICHIGAN COASTAL EROSION STUDY:
BIBLIOGRAPHY OF PUBLICATIONS BY THE
ILLINOIS STATE GEOLOGICAL SURVEY
January 1988 through March 1993**

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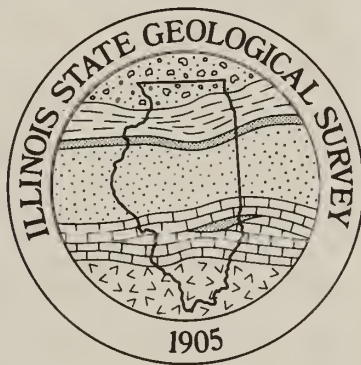
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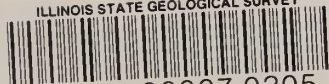
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INTRODUCTION

The Southern Lake Michigan Coastal Erosion Study was one of the first projects undertaken in what is now known as the National Coastal Geology Program of the U.S. Geological Survey (USGS). This program is designed to examine coastal geology of the U.S. ocean and Great Lakes coasts for the purpose of better understanding erosional processes, coastal pollution, and processes causing loss of coastal wetlands, as well as evaluating coastal hard-mineral resources. The southern Lake Michigan study was motivated by the record high levels of Lake Michigan that occurred in fall 1986 and winter 1987 that caused severe erosional problems along all of the Illinois and Indiana coast, and in particular, along the Chicago lakeshore. The high lake levels and the accompanying erosional problems established a need for coastal-geologic studies to provide data applicable to remedial action and mitigation along the Illinois and Indiana coasts.

The Southern Lake Michigan Coastal Erosion Study was a five-year study officially extending from October 1, 1987 through September 30, 1992 (*i.e.*, federal fiscal years 1987 through 1992). This was a cooperative study with the Atlantic and Pacific Marine Branches of the USGS, the state geological surveys in Illinois and Indiana, and university researchers in Illinois and Indiana involved in coastal studies. Additional contributions were made by researchers from universities in Washington and Oregon. During the course of the five-year project, participating researchers came from the following:

- U. S. Geological Survey (USGS)
- Illinois State Geological Survey (ISGS)
- Indiana Geological Survey (IGS)
- University of Illinois at Chicago, Department of Geology
- Northeastern Illinois University, Department of Geology
- Indiana University, Department of Geology
- Purdue University, School of Civil Engineering
- University of Washington, School of Oceanography
- Oregon State University, College of Oceanography

The project coordinator was Dr. David W. Folger, USGS Branch of Atlantic Marine Geology, Woods Hole, Massachusetts. The project was overseen by the USGS Center for Coastal Geology, St. Petersburg, Florida. Several researchers were funded by the USGS through the Illinois-Indiana Sea Grant College Program. Because of a contract funding cycle, the ISGS participation in the study extended from January 1988 through March 1993.



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The Southern Lake Michigan Coastal Erosion Study was divided into three categories of study:

1) Geologic Framework

Studies related to documenting geologic setting, coastal geomorphology, and coastal evolution.

2) Lake-Level History

Studies related to reconstructing lake-level history over the past 5,500 years to determine if lake levels in the recent geologic past exceeded the extreme high levels that have occurred during historical time.

3) Coastal Processes

Studies related to processes involved in coastal erosion and littoral sediment transport.

Within each of these broad categories were a variety of topics of investigation that were site specific or focused on a specific aspect of one of the three categories.

ROLE OF THE ILLINOIS STATE GEOLOGICAL SURVEY

Investigators from the ISGS were involved in all three of the project categories. The ISGS Principal Investigator (P.I.) from January 1988 through March 1991 was Charles W. Collinson. From April 1991 through the completion of the ISGS work on the project in March 1993, the P.I. was Michael J. Chrzastowski. During the five years of the co-op study, the following ISGS personnel received some degree of funding support for participation or assistance in the study:

Terrie Adams
Christine E. Bough
Michael J. Chrzastowski
Charles W. Collinson
Joel M. Dexter
Anne L. Erdmann
Leon R. Follmer
Christine S. Fucciolo
James W. Geiger
Ardith K. Hansel
Nancy P. Holm
Sharon L. Horstman
Holly D. Hunter

James R. Jennings
Joseph T. Kelleher III
Gregory J. McGovern
Allison M. Meanor
Michael V. Miller
James J. Miner
Beth M. Morgan
Matthew H. Riggs
Christopher L. Rompot
Thomas H. Shaw
Paul D. Terpstra
C. Brian Trask
Dan J. VanRoosendahl

BIBLIOGRAPHY CONTENT AND FORMAT

This bibliography is a compilation of publications for the Southern Lake Michigan Coastal Erosion Study that were authored and co-authored by ISGS members. This is not a complete bibliography of all publications resulting from the study; it is limited to contributions having ISGS authorship. Additional publications not listed here resulted from work by project members of the USGS, Indiana Geological Survey, and researchers from the participating universities.

This bibliography is divided into two parts. PART I is a listing of publications by author grouped according to publication year. PART II is a listing of publications by author grouped according to major topics of investigation. Preceding the bibliographic listing in PART II are brief overviews of each of the topics of investigation.

PART I

PUBLICATIONS LISTED BY PUBLICATION YEAR

1988 PUBLICATIONS

- Chrzastowski, M. J., 1988, Examination of nearshore bathymetry and shore-defense structures along Chicago's northside lakefront: Geological Society of America, Abstracts with Programs, v. 20, no. 5, p. 339.
- Chrzastowski, M. J., 1988, Illinois State Geological Survey role in Great Lakes coastal engineering research: pp. 49-50 *in* Meadows, L.A. (ed.), Great Lakes Coastal Erosion Research Needs, Workshop Summary, Michigan Sea Grant College Program, Ann Arbor, Michigan, 63 p.
- Chrzastowski, M. J., and Schlee, J. S., 1988, Preliminary sidescan sonar investigation of shore-defense structures along Chicago's northside lakefront: Wilson Avenue groin to Ohio Street beach: Illinois State Geological Survey Environmental Geology Notes 128, Champaign, Illinois, 32 p.
- Collinson, C., 1988, Lake Michigan water levels, geologic data and public policy in Illinois: Geological Society of America, Abstracts with Programs, v. 20, no. 5, p. 339.

1989 PUBLICATIONS

- Chrzastowski, M. J., 1989, Sidescan sonar examination of deteriorated revetments and bulkheads along Chicago's lake front: pp. 3931-3944 *in* Magoon, O. T., Converse, H., Miner, D., Tobin, L. T., and Clark, D. (eds.), Coastal Zone 89: Proceedings of the Sixth Symposium on Coastal and Ocean Management, July 11-14, 1989, Charleston, South Carolina, v. 4. 3988 p.

- Chrzastowski, M. J., 1989, Changes in coastal sedimentary dynamics resulting from water-level change and altered coastal geography: Geological Society of America, Abstracts with Programs, v. 21, no. 4, p. 6.
- Chrzastowski, M. J., 1989, Sidescan-sonar remote sensing of Chicago's lakefront revetments: pp. 8-9 *in* Dahlberg, R. E. (ed.), Illinois GIS and Mapnotes, Center for Government Studies, Northern Illinois University, Dekalb, Illinois, v. 9, no. 1 and 2, 19 p.
- Chrzastowski, M. J., 1989, Nearshore lake-bottom morphology along Chicago's northside lakefront: Illinois State Geological Survey Open-File Report (Manuscript), 38 manuscript pages, 30 figures, 2 tables.
- Chrzastowski, M. J., and Riggs, M. H., 1989, Hydrographic monitoring program in vicinity of North Point Marina on the Illinois Lake Michigan shore: Geological Society of America, Abstracts with Programs, v. 21, no. 4, p. 6.
- Collinson, C., 1989, Modern development of the Illinois Lake Michigan shore and its effects on coastal processes: Illinois State Academy of Sciences, suppl., v. 82, p. 50.
- Garlich, M. J., and Chrzastowski, M. J., 1989, An example of sidescan sonar in waterfront facilities evaluation: *in* Childs, K. M. (ed.), Ports '89, Proceedings of the Conference Sponsored by the Waterways, Ports, Coastal and Ocean Section of the American Society of Civil Engineers, May 22-24, 1989, Boston, Massachusetts, p. 84-94.
- Holm, N. P., and Morgan, B. M., 1989, Lake Michigan bibliography, volume 1, 1960-1976: Illinois State Geological Survey, Environmental Geology Notes 131, Champaign, Illinois, 452 p.
- Holm, N. P., and Morgan, B. M., 1989, Lake Michigan bibliography, volume 2, 1976-1986: Illinois State Geological Survey, Environmental Geology Notes 132, Champaign, Illinois, 532 p.
- Holm, N. P., and Morgan, B. M., 1989, Lake Michigan bibliography 1986-1988: Geological and Physical Processes: Illinois State Geological Survey Contract Report to U.S. Geological Survey, 443 p.
- Morgan, B. M., and Holm, N. P., 1989, Lake Michigan bibliography 1980 - 1989: Illinois State Geological Survey Contract Report to U.S. Geological Survey, 108 p.

Schlee, J. S., Chrzastowski, M. J., and North, L. P., 1989, Map showing the bottom topography of the Chicago near-northside lake front: U.S. Geological Survey Miscellaneous Field Studies, Map MF-2064, 1 sheet with text, contour map scale 1:12,000, 3-D mesh scale 1:24,000.

1990 PUBLICATIONS

- Chrzastowski, M. J., 1990, Proposed rebuilding of Chicago's decaying lake front structures: *in* The Helm, Happenings and Educational Activities Around Lake Michigan, Illinois-Indiana Sea Grant Program (Newsletter), v. 6, no. 1, Spring/Summer 1990, p. 3.
- Chrzastowski, M. J., 1990, Late Wisconsinan and Holocene littoral drift patterns in southern Lake Michigan: pp. 13-18 *in* Barnes, P. W. (ed.), Coastal Sedimentary Processes in Southern Lake Michigan: Their Influence on Coastal Erosion, U.S. Geological Survey Open-File Report 90-295, 55 p.
- Chrzastowski, M. J., 1990, Estimate of the natural state littoral transport along the Chicago lakeshore: pp. 19-26 *in* Barnes, P. W. (ed.), Coastal Sedimentary Processes in Southern Lake Michigan: Their Influence on Coastal Erosion, U.S. Geological Survey Open-File Report 90-295, 55 p.
- Chrzastowski, M. J., 1990, Southern Lake Michigan coastal erosion studies: p. 15 *in* Folger, D. W., Colman, S. M., and Barnes, P. W. (eds.), Southern Lake Michigan Coastal Erosion Study Workshop, U.S. Geological Survey Center for Coastal Geology, February 6-7, 1990, St. Petersburg, Florida, U.S. Geological Survey Open-File Report 90-272, 25 p.
- Chrzastowski, M. J., Folger, D. W., Polloni, C. F., Pranschke, F. A., and Shabica, C. W., 1990, Geologic setting of the Olson tree site, southern Lake Michigan: Geological Society of America, Abstracts with Programs, v. 22, no. 7, p. A85.

- Chrzastowski, M. J., Pranschke, F. A., and Shabica, C. W., 1990, Discovery and radiocarbon dating of tree stumps in growth position on the floor of southern Lake Michigan: p. 10 *in* Folger, D. W., Colman, S. M., and Barnes, P. W. (eds.), Southern Lake Michigan Coastal Erosion Study Workshop, U.S. Geological Survey Center for Coastal Geology, February 6-7, St. Petersburg, Florida, U.S. Geological Survey Open-File Report 90-272, 25 p.
- Chrzastowski, M. J., and Terpstra, P. D., 1990, 1989 shore erosion and rapid development of logarithmic-spiral recession at North Point Marina, Lake County, Illinois: pp. 27-31 *in* Barnes, P. W. (ed.), Coastal Sedimentary Processes in Southern Lake Michigan: Their Influence on Coastal Erosion, U.S. Geological Survey Open-File Report 90-295, 55 p.
- Chrzastowski, M. J., and Terpstra, P. D., 1990, Coastal geomorphic changes during 1988-89 at North Point Marina, Winthrop Harbor, Illinois: p. 13 *in* Folger, D. W., Colman, S. M., and Barnes, P. W. (eds.), Southern Lake Michigan Coastal Erosion Study Workshop, U.S. Geological Survey Center for Coastal Geology, February 6-7, St. Petersburg, Florida, U.S. Geological Survey Open-File Report 90-272, 25 p.
- Chrzastowski, M. J., and Terpstra, P. D., 1990, Monitoring of 1988-89 beach and nearshore geomorphic changes at North Point Marina, Winthrop Harbor, Illinois: Geological Society of America, Abstracts with Programs, v. 22, no. 5, p. 6.
- Collinson, C., Jennings, J. R., Terpstra, P. D., and Hansel, A. K., 1990, Coastal processes and erosion on the Illinois Lake Michigan shore: pp. A1-A38 *in* Hammer, W., and Hess, D. F. (eds.), Geology Field Guidebook, Current Perspectives on Illinois Basin and Mississippian Arch Geology: Western Illinois University, Macomb, Illinois, 226 p.
- Hansel, A. K., Chrzastowski, M. J., Riggs, M. H., Miller, M. V., and Follmer, L. R., 1990, New ¹⁴C ages on late Holocene peat accumulation in beach-ridge swales at Illinois Beach State Park: Geological Society of America, Abstracts with Programs, v. 22, no. 5, p. 12.
- Hansel, A. K., Chrzastowski, M. J., Riggs, M. H., Miller, M. V., and Follmer, L. R., 1990, ¹⁴C ages on late Holocene peat accumulation in beach-ridge swales at Illinois Beach State Park: p. 4 *in* Folger, D. W., Colman, S. M., and Barnes, P. W. (eds.), Southern Lake Michigan Coastal Erosion Study Workshop, U.S. Geological Survey Center for Coastal Geology, February 6-7, 1990, St. Petersburg, Florida, U.S. Geological Survey Open-File Report 90-272, 25 p.

- Jennings, J. R., 1990, 150-year erosion history at a beach ridge and dune plain on the Illinois Lake Michigan shore: Programs and Abstracts, International Association of Great Lakes Research, 33rd Conference, May 13-17, 1990, Windsor, Ontario, p. 67.
- Jennings, J. R., 1990, 150-year erosion history of a beach ridge and dune plain on the Illinois Lake Michigan shore: p. 708 *in* Saunders, K. E., Law, M. N., Mackinnon-Burwell, D., Abel, M. J., and Maurielle, M. N., (eds.), Delineation of Erosion Hazard Shorelands, Workshop Summary, Great Lakes Shoreland Management Workshop, June 21-23, 1990, Cleveland, Ohio, 56 p.
- Pranschke, F. A., Shabica, C. W., and Chrzastowski, M. J., 1990, Discovery of an early Holocene relict forest on the floor of southern Lake Michigan, Geological Society of America, Abstracts with Programs, v. 22, no. 5, p. 42.
- Pranschke, F. A., Shabica, C. W., and Chrzastowski, M. J., 1990, Early Holocene forest remains on the floor of southern Lake Michigan: Transactions of the Illinois State Academy of Sciences, 83rd Annual Meeting, October 26-27, 1990, Champaign, Illinois.
- Schlee, J. S., Risch, J. S., Polloni, C. F., Foster, D. S., Folger, D. W., Chrzastowski, M. J., and Thompson, T. A., 1990, Dredging scars evident on Indiana Shoals, southern Lake Michigan: Programs and Abstracts, International Association of Great Lakes Research, 33rd Conference, May 13-17, Windsor, Ontario, p. 128.
- Terpstra, P. D., and Chrzastowski, M. J., 1990, Rapid development of a headland-bay beach on the Illinois Lake Michigan shore: Geological Society of America, Abstracts with Programs, v. 22, no. 5, p. 46.
- Terpstra, P. D., and Chrzastowski, M. J., 1990, Rapid development of a log-spiral beach on the Illinois shoreline: Programs and Abstracts, International Association of Great Lakes Research, 33rd Conference, May 13-17, 1990, Windsor, Ontario, p. 66.
- Terpstra, P. D., and Chrzastowski, M. J., 1990, Rapid development of a log-spiral beach on the Illinois shoreline: pp. 35-38 *in* Saunders, K. E., Law, M. N., MacKinnon-Burwell, D., Abel, M. J., and Mauriello, M. N. (eds.), Delineation of Erosion Hazard Shorelands, Workshop Summary, Great Lakes Shoreland Management Workshop, June 21-23, 1990, Cleveland, Ohio, 56 p.

1991 PUBLICATIONS

- Chrzastowski, M. J., 1991, Coastal geology and coastal Engineering of the Illinois shore of Lake Michigan (Field Trip Guide 6): pp. 6/1-6/41 *in* Killey, M. M. (ed.), Association of Engineering Geologists, Field Trip Guidebook, 34th Annual Meeting, Chicago, Illinois.
- Chrzastowski, M. J., 1991, The building, deterioration and proposed rebuilding of the Chicago lakefront: Shore and Beach, Journal of the American Shore and Beach Preservation Association, v. 59, no. 2, pp. 2-10.
- Chrzastowski, M. J., 1991, Late Holocene coastal evolution of the central Chicago lakeshore and model for related evolution of the Chicago river: *in* Folger, D. W., Colman, S. M., and Barnes, P. W. (eds.), Third Annual Southern Lake Michigan Coastal Erosion Workshop (Abstracts and Program), U.S. Geological Survey Open-File Report 91-284, pp. 19-21.
- Chrzastowski, M. J., 1991, North American late Quaternary coastal evolution: similarities and contrasts between the Great Lake coasts of southern Lake Michigan and the U.S. mid-Atlantic coast: p. 2 *in* Zhao Xitao and Li Bo (eds.), Abstracts of the International Geologic Correlation Program (IGCP) Project 274, 1991 Symposium, Hainan Island, China; Academia Sinica, Institute of Geology, Beijing, Peoples Republic of China, 38 p.
- Chrzastowski, M. J., Pranschke, F. A., and Shabica, C. W., 1991, Discovery and preliminary investigations of the remains of an early Holocene forest on the floor of southern Lake Michigan: Journal of Great Lakes Research, v. 17, no. 4, pp. 543-552.
- Chrzastowski, M. J., and Terpstra, P. D., 1991, Monitoring of 1989-1990 beach and near-shore geomorphic changes at North Point Marina, Winthrop Harbor, Illinois: Geological Society of America, Abstracts with Programs, v. 23, no. 3, p. 7.
- Chrzastowski, M. J., and Thompson, T. A., 1991, Coastal evolution of the southern shore of Lake Michigan since late Wisconsinan time: pp. 24-25 *in* Donaghue, J. F., Davis, R. A. Jr., Fletcher, C. H., and Suter, J. R., (eds.), Programs and Abstracts, Research Conference on Quaternary Coastal Evolution, SEPM/Society for Sedimentary Geology, Tulsa, Oklahoma, 128 p.

Illinois State Geological Survey, Ancient river channels discovered on floor of southwestern Lake Michigan: Champaign, Illinois ISGS Geonews (Newsletter), Winter, 1991, p. 7.

Shabica, C. W., Pranschke, F. A., and Chrzastowski, M. J., 1991, Sediment entrapment of coastal structures along the Illinois shore of Lake Michigan: Program and Abstracts, 34th Conference on Great Lakes Research, International Association for Great Lakes Research, p. 76.

Shabica, C. W., Pranschke, F. A., and Chrzastowski, M. J., 1991, Survey of littoral drift sand deposits along the Illinois shore of Lake Michigan from Fort Sheridan to Evanston: Illinois-Indiana Sea Grant Program, Technical Report IL-IN-SG-R-91-3, Champaign, Illinois, 15 p.

Terpstra, P. D., and Chrzastowski, M. J., 1991, Mathematical trends in the erosional evolution of a logarithmic-spiral bay on the Illinois shore: *in* Folger, D. W., Colman, S. M., and Barnes, P. W., (eds.), Third Annual Southern Lake Michigan Coastal Erosion Workshop (Abstracts and Program), U. S. Geological Survey Open-File Report 91-284, pp. 47-48.

Terpstra, P. D., and Chrzastowski, M. J., 1991, Summary of lake bottom changes at North Point Marina vicinity between 1988 and 1990: Program and Abstracts, 34th Conference on Great Lakes Research, International Association for Great Lakes Research, p. 76.

1992 PUBLICATIONS

Chrzastowski, M. J., 1992, Coastal geomorphic characteristics of the Illinois-Indiana coast of southern Lake Michigan: pp. 18-23 *in* Folger, D. W., Colman, S. M., and Barnes, P. W. (eds.), Fourth Annual Southern Lake Michigan Coastal Erosion Workshop, U.S. Geological Survey Open-File Report 92-324, 116 p.

Chrzastowski, M. J., 1992, Human influence on the coastal evolution of the Illinois shore of Lake Michigan: Geological Society of America, Abstracts with Programs, v. 24, no. 2, p. 8.

- Chrzastowski, M. J., Erdmann, A. L., and Stohr, C. J., 1992, Problems encountered in establishing a historical erosion-rate database for the Illinois coast of Lake Michigan: Geological Society of America, Abstracts with Programs, v. 24, no. 7, p. A123.
- Chrzastowski, M. J., and Terpstra, P. D., 1992, Monitoring of 1990-1991 beach and nearshore geomorphic changes at North Point Marina, Winthrop Harbor, Illinois: Geological Society of America Abstracts with Programs, vol. 24, no. 4, p. 9.
- Chrzastowski, M. J., and Terpstra, P. D., 1992, Summary of 1987 to 1991 monitoring of coastal erosion in the vicinity of North Point Marina, Winthrop Harbor, Illinois: pp. 60-62 *in* Folger, D. W., Colman, S. M., and Barnes, P. W. (eds.), Fourth Annual Southern Lake Michigan Coastal Erosion Workshop, U.S. Geological Survey Open-File Report 92-324, 116 p.
- Chrzastowski, M. J., Terpstra, P. D., and Thompson, T. A., 1992, The fit of a logarithmic-spiral curve to the Illinois-Indiana shoreline of southern Lake Michigan: Geological Society of America, Abstracts with Programs, v. 24, no. 4, p. 9.
- Chrzastowski, M. J., and Thompson, T. A., 1992, Late Wisconsinan and Holocene coastal evolution of the southern shore of Lake Michigan: pp. 397-413, *in* Fletcher, C. H. and Wehmiller, J. F. (eds.), Quaternary Coasts of the United States, Marine and Lacustrine Systems; SEPM Special Publication 48, SEPM/Society for Sedimentary Geology, Tulsa, Oklahoma, 460 p.
- Terpstra, P. D., and Chrzastowski, M. J., 1992, Geometric trends in the evolution of a small log-spiral embayment on the Illinois shore of Lake Michigan: Journal of Coastal Research, v. 8, no. 3, pp. 603-617.
- Terpstra, P. D., and Chrzastowski, M. J., 1992, 1987-1991 beach and nearshore monitoring at a major coastal engineering project on the Illinois shore of Lake Michigan: Geological Society of America, Abstracts with Programs, v. 24, no. 7, p. A118.

1993 PUBLICATIONS (January 1 through March 31)
Status of Publications as of March 31, 1993

- Chrzastowski, M. J. and Thompson, T. A., 1993, Late Wisconsinan and Holocene geologic history of the Illinois-Indiana coast of Lake Michigan: Journal of Great Lakes Research, Symposium Volume for the USGS/ISGS/IGS Southern Lake Michigan Coastal Erosion Study, 33 ms p., 11 figs. (in review).
- Chrzastowski, M. J., Thompson, T. A., and Trask, C. B., 1993, Coastal geomorphology and littoral cell divisions along the Illinois-Indiana coast of Lake Michigan: Journal of Great Lakes Research, Symposium Volume for the USGS/ISGS/IGS Southern Lake Michigan Coastal Erosion Study, 34 ms p., 8 figs., 1 table (in review).
- Terpstra, P. D., and Chrzastowski, M. J., 1993, 1987 to 1992 beach and nearshore changes in the vicinity of North Point Marina on the Illinois coast of Lake Michigan: U.S. Geological Survey, CD-ROM product; text, ARC/INFO maps and ARC/INFO profiles (in review).

PART II

PUBLICATIONS LISTED BY TOPICS OF INVESTIGATION

Within the overall project design of studies related to geologic framework, lake-level history, and coastal processes, ISGS participants in the Southern Lake Michigan Control Erosion Study contributed publications that related to nine different major topics of investigation plus two field trip guidebooks. The following is a listing of these topics of investigation and a brief description of the purpose and/or focus of study. The topics are listed in alphabetical order.

I Bibliographic Compilations

At the inception of the Southern Lake Michigan Coastal Erosion Study, the ISGS was involved in the compilation of a bibliographic record of Lake Michigan research. This work began under a contract from the Joyce Foundation and Illinois Department of Energy and Natural Resources, and was then expanded and completed through funding obtained in the USGS-sponsored Southern Lake Michigan Study.

II Chicago Lakefront Studies

The record high lake levels in 1986 and the high-wave events occurring during the high lake levels resulted in heightened public and government-agency concern for the advanced stage of deterioration along the Chicago lakefront. One concern was identifying the causes of failure along the city's timber and stepped-stone revetments. The Southern Lake Michigan Study used sidescan sonar to examine the underwater condition of the shore structures. In addition, bathymetric studies were completed along selected nearshore reaches. A report published by the ISGS (Chrzastowski and Schlee, 1988) presented the first definitive model of the coastal processes leading to revetment failure. A paper published in *Shore and Beach* (Chrzastowski, 1991) summarizes the problems of structural deterioration and erosion along the Chicago lakefront, and the proposed designs for rebuilding the lakefront.

III Coastal Evolution

As part of the project division focused on geologic framework, the evolution of the southern shore of Lake Michigan was examined for the past 14,000 years since glacial ice first receded from the end moraines that border the southern lake margin. The paleogeographic reconstructions resulting from this work revised some of the previous reconstructions done in the late 1800s and

early to middle 1900s. Issues addressed and resolved were the limits of the littoral drift convergence along the southern lakeshore, when this convergence first developed, and the role of coastal processes in the evolution of the drainage patterns for the Little Calumet, Grand Calumet, and Chicago Rivers. Additionally it was recognized that over the past 2,000 years or so, two areas of substantial coastal erosion in southern Lake Michigan have been the shore along the central Chicago lakefront and the shore in the vicinity of the Illinois-Indiana state line. Of the several abstract and short papers resulting from this work, the most complete summary is a paper included in SEPM Special Publication No. 48 (Chrzastowski and Thompson, 1992).

IV Coastal Management Issues

A short paper and two abstracts resulted from participation in a workshop and two scientific meetings at which ISGS gave talks addressing how coastal management relates to coastal geology and coastal processes. The workshop was held in 1987 at the University of Michigan and was sponsored by the Michigan Sea Grant College Program. This workshop addressed research needs for coastal erosion throughout the entire Great Lakes system. Talks given at scientific meetings were the 1988 North-Central Section meeting of the Geological Society of America, and the 1989 annual meeting of the Illinois State Academy of Sciences.

V Illinois Beach State Park Stratigraphy and Sedimentology

The Southern Lake Michigan Coastal Erosion Study addressed the issue of lake-level history over the past 5,500 years in order to determine if lake levels in the recent geologic past exceeded the extreme levels that have occurred during historical time. Along the Illinois shore, studies were conducted along the beach-ridge plain located south of the Wisconsin-Illinois state line. Along three coast-perpendicular transects, vibracores were collected and examined to determine elevation of plunge-point deposits that record elevation of lake level at the time of ridge formation. Inter-ridge basal peats were radiocarbon dated to provide minimum dates for the ridge formation and associated lake level. The studies at Illinois Beach State Park did not result in definitive information regarding lake level history, but new and more detailed information was gained concerning age control for beach ridge formation and the evolution of this coastal landform.

VI Indiana Shoals Sedimentology and Geomorphology

An initial concern of this study was to examine potential offshore sand reservoirs that could be used as borrow sites for replenishing and building beaches, particularly along the Chicago lakefront. The Indiana Shoals is a broad, bathymetric high that straddles the Illinois-Indiana state line. The shoals had been used as a borrow site for sand and gravel during construction of lakefill along the Chicago lakefront in the early 20th century. The shoals were examined to determine if this area could again be a sand reservoir and borrow site. Sidescan sonar, bathymetric mapping, and bottom samples were collected to characterize the shoal area. The primary publication resulting from this work will be published by the USGS.

VII Littoral Transport Processes

The coastal processes component of this study examined various processes causing coastal erosion and the effects of coastal erosion. Investigation topics included the role of ice in the transport of sediment from the coast, erosion across the glacial-till lake bottom, changes to the littoral transport patterns caused by the construction of littoral transport barriers, and historical changes to shorelines and beach morphology. A short paper addressing the natural-state littoral transport rate along the Chicago lakefront (Chrzastowski, 1990) provides a reference as to the degree that urban development has altered littoral transport along the Chicago lakefront, and an estimate of the volume of sediment that has not been supplied to the Indiana coast because of the Chicago lakefront development. A paper published through the Illinois-Indiana Sea Grant College Program (Shabica *et al.*, 1991) documents the degree of historical depletion of sand thickness along selected beach and nearshore profile lines of the northern Illinois coast.

VIII North Point Marina Coastal Monitoring

In 1987 the State of Illinois began construction on North Point Marina located adjacent to the Wisconsin-Illinois state line. This 1500-slip marina, largest in the Great Lakes, straddles the preconstruction shoreline and was constructed by a combination of excavating a marina basin into the beach and backshore and constructing shore-attached, rubble-mound breakwaters that extended into the nearshore zone. Approximately 1.2 million cubic meters of sand and gravelly sand were excavated and placed on the marina's south (downdrift) shore as a feeder beach to provide downdrift nourishment. The project provided an unprecedented opportunity to monitor beach and nearshore changes along this reach of the Illinois coast resulting from the marina

construction. Annual beach and nearshore bathymetric profiling was conducted from 1988 through 1992. Annual bathymetric maps and annual lake-bottom change maps were prepared. This monitoring assisted the Illinois Department of Conservation in the sand management and coastal erosion mitigation near the marina. All digital map data from the monitoring program are compiled in a CD-ROM product published by the USGS (Terpstra and Chrzastowski, 1993, in review). A paper published in *Journal of Coastal Research* (Terpstra and Chrzastowski, 1992) summarizes the erosional development of a logarithmic-spiral embayment downdrift from the marina.

IX Olson Site Investigations

During the summer of 1989, salvage operators discovered a site of rooted tree stumps on the floor of southern Lake Michigan approximately 25 km east-southeast of the Chicago Harbor Lighthouse. Radiocarbon dating of three samples from three different stumps determined a median age of about 8,300 years B.P. (Pranschke *et al.*, 1990). The location is now known as the Olson site, named after the lead salvage operator (A. Olson) responsible for the discovery. Sidescan-sonar and seismic-reflection surveys were conducted across the area in 1990 in order to provide additional information on the geological setting (Chrzastowski, *et al.*, 1990). A paper published in *Journal of Great Lakes Research* (Chrzastowski, *et al.*, 1991) summarizes results of the preliminary site investigations. The Olson site provides unprecedented data on lake-level history during the Chippewa low phase of ancestral Lake Michigan (approx. 10,000 - 5,500 years B.P.) and thus provided a means to expand the time frame for reconstructing lake-level history.

X Field Trip Guidebooks

Several field trips were held along the Illinois and Indiana coast during the tenure of the Southern Lake Michigan Coastal Erosion Study. These trips highlighted findings of the study and the variety of erosion and coastal management issues along this coast. Two field trips for scientific meetings resulted in published guidebooks. A guidebook was prepared for a pre-meeting fieldtrip associated with the 24th Annual Meeting of the North-Central Section of the Geological Society of America held in Macomb, Illinois in April 1990 (Collinson, *et al.*, 1990). A guidebook was prepared for a post-meeting fieldtrip associated with the 34th Annual Meeting of the Association of Engineering Geologists held in St. Charles, Illinois in October 1991 (Chrzastowski, 1991).

I Bibliographic Compilations

- Holm, N. P., and Morgan, B. M., 1989, Lake Michigan bibliography, volume 1, 1960-1976: Illinois State Geological Survey, Environmental Geology Notes 131, Champaign, Illinois, 452 p.
- Holm, N. P., and Morgan, B. M., 1989, Lake Michigan bibliography, volume 2, 1976-1986: Illinois State Geological Survey, Environmental Geology Notes 132, Champaign, Illinois, 532 p.
- Holm, N. P., and Morgan, B. M., 1989, Lake Michigan bibliography 1986-1988: Geological and Physical Processes: Illinois State Geological Survey Contract Report to U.S. Geological Survey, 443 p.
- Morgan, B. M., and Holm, N. P., 1989, Lake Michigan bibliography 1980-1989: Illinois State Geological Survey Contract Report to U.S. Geological Survey, 108 p.

II Chicago Lakefront Studies

- Chrzastowski, M. J., 1988, Examination of nearshore bathymetry and shore-defense structures along Chicago's northside lakefront: Geological Society of America, Abstracts with Programs, v. 20, no. 5, p. 339.
- Chrzastowski, M. J., 1989, Sidescan sonar examination of deteriorated revetments and bulkheads along Chicago's lake front: pp. 3931-3944 *in* Magoon, O. T., Converse, H., Miner, D., Tobin, L. T., and Clark, D. (eds.), Coastal Zone 89: Proceedings of the Sixth Symposium on Coastal and Ocean Management, July 11-14, 1989, Charleston, South Carolina, v. 4, 3988 p.
- Chrzastowski, M. J., 1989, Sidescan-sonar remote sensing of Chicago's lakefront revetments: pp. 8-9 *in* Dahlberg, R. E. (ed.), Illinois GIS and Mapnotes, Center for Government Studies, Northern Illinois University, Dekalb, Illinois, v. 9, no. 1 and 2, 19 p.

- Chrzastowski, M. J., 1989, Nearshore lake-bottom morphology along Chicago's northside lakefront: Illinois State Geological Survey Open-File Report (Manuscript), 38 manuscript pages, 30 figures, 2 tables.
- Chrzastowski, M. J., 1990, Proposed rebuilding of Chicago's decaying lake front structures: *in* The Helm, Happenings and Educational Activities Around Lake Michigan, Illinois-Indiana Sea Grant College Program (Newsletter), v. 6, no. 1, Spring/Summer 1990, p. 3.
- Chrzastowski, M. J., 1991, The building, deterioration and proposed rebuilding of the Chicago lakefront: Shore and Beach, Journal of the American Shore and Beach Preservation Association, v. 59, no. 2, pp. 2-10.
- Chrzastowski, M. J., and Schlee, J. S., 1988, Preliminary sidescan sonar investigation of shore-defense structures along Chicago's northside lakefront: Wilson Avenue groin to Ohio Street beach: Illinois State Geological Survey Environmental Geology Notes 128, Champaign, Illinois, 32 p.
- Garlich, M. J., and Chrzastowski, M. J., 1989, An example of sidescan sonar in waterfront facilities evaluation: *in* Childs, K. M. (ed.), Ports '89, Proceedings of the Conference Sponsored by the Waterways, Ports, Coastal and Ocean Section of the American Society of Civil Engineers, May 22-24, 1989, Boston, Massachusetts, pp. 84-94.
- Schlee, J. S., Chrzastowski, M. J., and North, L. P., 1989, Map showing the bottom topography of the Chicago near-northside lake front: U.S. Geological Survey Miscellaneous Field Studies, Map MF-2064, 1 sheet with text, contour map scale 1:12,000, 3-D mesh scale 1:24,000.

III Coastal Evolution

- Chrzastowski, M. J., 1989, Changes in coastal sedimentary dynamics resulting from water-level change and altered coastal geography: Geological Society of America, Abstracts with Programs, v. 21, no. 4, p. 6.
- Chrzastowski, M. J., 1991, Late Holocene coastal evolution of the central Chicago lakeshore and model for related evolution of the Chicago river: *in* Folger, D. W., Colman, S. M., and Barnes, P. W. (eds.), Third Annual Southern Lake Michigan Coastal Erosion Workshop (Abstracts and Program), U.S. Geological Survey Open-File Report 91-284, pp. 19-21.

- Chrzastowski, M. J., 1991, North American late Quaternary coastal evolution: similarities and contrasts between the Great Lake coasts of southern Lake Michigan and the U.S. mid-Atlantic coast: p. 2 *in* Zhao Xitao, and Li Bo (eds.), Abstracts of the International Geologic Correlation Programme (IGCP) Project 274, 1991 Symposium, Hainan Island, China; Academia Sinica, Institute of Geology, Beijing, Peoples Republic of China, 38 p.
- Chrzastowski, M. J., 1992, Coastal geomorphic characteristics of the Illinois-Indiana coast of southern Lake Michigan: pp. 18-23 *in* Folger, D. W., Colman, S. M., and Barnes, P. W. (eds.), Fourth Annual Southern Lake Michigan Coastal Erosion Workshop, U.S. Geological Survey Open-File Report 92-324, 116 p.
- Chrzastowski, M. J., 1992, Human influence on the coastal evolution of the Illinois shore of Lake Michigan: Geological Society of America, Abstracts with Programs, v. 24, no. 2, p. 8.
- Chrzastowski, M. J., Erdmann, A. L., and Stohr, C. J., 1992, Problems encountered in establishing a historical erosion-rate database for the Illinois coast of Lake Michigan: Geological Society of America, Abstracts with Programs, v. 24, no. 7, p. A123.
- Chrzastowski, M. J. and Thompson, T. A., 1991, Coastal evolution of the southern shore of Lake Michigan since late Wisconsinan time: pp. 24-25, *in* Donaghue, J. F., Davis, R. A. Jr., Fletcher, C. H., and Suter, J. R. (eds.), Programs and Abstracts, Research Conference on Quaternary Coastal Evolution, SEPM/Society for Sedimentary Geology, Tulsa, Oklahoma, 128 p.
- Chrzastowski, M. J. and Thompson, T. A., 1992, Late Wisconsinan and Holocene coastal evolution of the southern shore of Lake Michigan: pp. 397-413, *in* Fletcher, C. H. and Wehmiller, J. F. (eds.), Quaternary Coasts of the United States, Marine and Lacustrine Systems; SEPM Special Publication 48, SEPM/Society for Sedimentary Geology, Tulsa, Oklahoma, 460 p.
- Chrzastowski, M. J. and Thompson, T. A., 1993, Late Wisconsinan and Holocene geologic history of the Illinois-Indiana coast of Lake Michigan: Journal of Great Lakes Research, Symposium Volume for the USGS/ISGS/IGS Southern Lake Michigan Coastal Erosion Study, 33 ms p., 11 figs. (in review).

IV Coastal Management Issues

Chrzastowski, M. J., 1988, Illinois State Geological Survey role in Great Lakes coastal engineering research: pp. 49-50 *in* Meadows, L. A. (ed.), Great Lakes Coastal Erosion Research Needs, Workshop Summary, Michigan Sea Grant College Program, Ann Arbor, Michigan, 63 p.

Collinson, C., 1988, Lake Michigan water levels, geologic data and public policy in Illinois: Geological Society of America, Abstracts with Programs, v. 20, no. 5, p. 339.

Collinson, C., 1989, Modern development of the Illinois Lake Michigan shore and its effects on coastal processes: Illinois State Academy of Sciences, suppl., v. 82, p. 50.

V Illinois Beach State Park Stratigraphy/Sedimentology

Hansel, A. K., Chrzastowski, M. J., Riggs, M. H., Miller, M. V., and Follmer, L. R., 1990, New ¹⁴C ages on late Holocene peat accumulation in beach-ridge swales at Illinois Beach State Park: Geological Society of America, Abstracts with Programs, v. 22, no. 5, p. 12.

Hansel, A. K., Chrzastowski, M. J., Riggs, M. H., Miller, M. V., and Follmer, L. R., 1990, ¹⁴C ages on late Holocene peat accumulation in beach-ridge swales at Illinois Beach State Park: p. 4 *in* Folger, D. W., Colman, S. M., and Barnes, P. W. (eds.), Southern Lake Michigan Coastal Erosion Study Workshop, U.S. Geological Survey Center for Coastal Geology, February 6-7, 1990, St. Petersburg, Florida, U.S. Geological Survey Open-File Report 90-272, 25 p.

VI Indiana Shoals Geomorphology

Schlee, J. S., Risch, J. S., Polloni, C. F., Foster, D. S., Folger, D. W., Chrzastowski, M. J., and Thompson, T. A., 1990, Dredging scars evident on Indiana Shoals, southern Lake Michigan: Programs and Abstracts, International Association of Great Lakes Research, 33rd Conference, May 13-17, Windsor, Ontario, p. 128.

VII Littoral Transport Processes

Chrzastowski, M. J., 1990, Late Wisconsinan and Holocene littoral drift patterns in southern Lake Michigan: pp. 13-18 *in* Barnes, P. W. (ed.), Coastal Sedimentary Processes in Southern Lake Michigan: Their Influence on Coastal Erosion, U.S. Geological Survey Open-File Report 90-295, 55 p.

Chrzastowski, M. J., 1990, Estimate of the natural state littoral transport along the Chicago lakeshore: pp. 19-26 *in* Barnes, P. W. (ed.), Coastal Sedimentary Processes in Southern Lake Michigan: Their Influence on Coastal Erosion, U.S. Geological Survey Open-File Report 90-295, 55 p.

Chrzastowski, M. J., 1990, Southern Lake Michigan coastal erosion studies: p. 15 *in* Folger, D. W., Colman, S. M., and Barnes, P. W. (eds.), Southern Lake Michigan Coastal Erosion Study Workshop, U.S. Geological Survey Center for Coastal Geology, February 6-7, 1990, St. Petersburg, Florida, U.S. Geological Survey Open-File Report 90-272, 25 p.

Chrzastowski, M. J., Thompson, T. A., and Trask, C. B., 1993, Coastal geomorphology and littoral cell divisions along the Illinois-Indiana coast of Lake Michigan: Journal of Great Lakes Research, Symposium Volume for the USGS/ISGS/IGS Southern Lake Michigan Coastal Erosion Study, 34 ms p., 8 figs., 1 table (in review).

- Jennings, J. R., 1990, 150-year erosion history at a beach ridge and dune plain on the Illinois Lake Michigan shore: Programs and Abstracts, International Association of Great Lakes Research, 33rd Conference, May 13-17, 1990, Windsor, Ontario, p. 67.
- Jennings, J. R., 1990, 150-year erosion history of a beach ridge and dune plain on the Illinois Lake Michigan shore: p. 708 *in* Saunders, K. E., Law, M. N., Mackinnon-Burwell, D., Abel, M. J., and Maurielle, M. N., (eds.), Delineation of Erosion Hazard Shorelands, Workshop Summary, Great Lakes Shoreland Management Workshop, June 21-23, 1990, Cleveland, Ohio, 56 p.
- Shabica, C. W., Pranschke, F. A., and Chrzastowski, M. J., 1991, Sediment entrapment of coastal structures along the Illinois shore of Lake Michigan: Program and Abstracts, 34th Conference on Great Lakes Research, International Association for Great Lakes Research, p. 76.
- Shabica, C. W., Pranschke, F. A. and Chrzastowski, M. J., 1991, Survey of littoral drift sand deposits along the Illinois shore of Lake Michigan from Fort Sheridan to Evanston: Illinois-Indiana Sea Grant Program, Technical Report IL-IN-SG-R-91-3, Champaign, Illinois, 15 p.

VIII North Point Marina Coastal Monitoring

- Chrzastowski, M. J., and Riggs, M. H., 1989, Hydrographic monitoring program in vicinity of North Point Marina on the Illinois Lake Michigan shore: Geological Society of America, Abstracts with Programs, v. 21, no. 4, p. 6.
- Chrzastowski, M. J. and Terpstra, P. D., 1990, 1989 shore erosion and rapid development of logarithmic-spiral recession at North Point Marina, Lake County, Illinois: pp. 27-31 *in* Barnes, P. W. (ed.), Coastal Sedimentary Processes in Southern Lake Michigan: Their Influence on Coastal Erosion, U.S. Geological Survey Open-File Report 90-295, 55 p.
- Chrzastowski, M. J., and Terpstra, P. D., 1990, Coastal geomorphic changes during 1988-89 at North Point Marina, Winthrop Harbor, Illinois: p. 13 *in* Folger, D. W., Colman, S. M., and Barnes, P. W. (eds.), Southern Lake Michigan Coastal Erosion Study Workshop, U.S. Geological Survey Center for Coastal Geology, February 6-7, St. Petersburg, Florida, U.S. Geological Survey Open-File Report 90-272, 25 p.

- Chrzastowski, M. J., and Terpstra, P. D., 1990, Monitoring of 1988-89 beach and nearshore geomorphic changes at North Point Marina, Winthrop Harbor, Illinois: Geological Society of America, Abstracts with Programs, v. 22, no. 5, p. 6.
- Chrzastowski, M. J. and Terpstra, P. D., 1991, Monitoring of 1989-1990 beach and near-shore geomorphic changes at North Point Marina, Winthrop Harbor, Illinois: Geological Society of America Abstracts with Programs, v. 23, no. 3, p. 7.
- Chrzastowski, M. J., and Terpstra, P. D., 1992, Monitoring of 1990-1991 beach and nearshore geomorphic changes at North Point Marina, Winthrop Harbor, Illinois: Geological Society of America Abstracts with Programs, vol. 24, no. 4, p. 9.
- Chrzastowski, M. J. and Terpstra, P. D., 1992, Summary of 1987 to 1991 monitoring of coastal erosion in the vicinity of North Point Marina, Winthrop Harbor, Illinois: pp. 60-62 *in* Folger, D. W., Colman, S. M. and Barnes, P. W. (eds.), Fourth Annual Southern Lake Michigan Coastal Erosion Workshop, U.S. Geological Survey Open-File Report 92-324, 116 p.
- Chrzastowski, M. J., Terpstra, P. D., and Thompson, T. A., 1992, The fit of a logarithmic-spiral curve to the Illinois-Indiana shoreline of southern Lake Michigan: Geological Society of America, Abstracts with Programs, v. 24, no. 4, p. 9.
- Terpstra, P. D. and Chrzastowski, M. J., 1990, Rapid development of a headland-bay beach on the Illinois Lake Michigan shore: Geological Society of America, Abstracts with Programs, v. 22, no. 5, p. 46.
- Terpstra, P. D. and Chrzastowski, M. J., 1990, Rapid development of a log-spiral beach on the Illinois shoreline: Programs and Abstracts, International Association of Great Lakes Research, 33rd Conference, May 13-17, 1990, Windsor, Ontario, p. 66.
- Terpstra, P. D., and Chrzastowski, M. J., 1990, Rapid development of a log-spiral beach on the Illinois shoreline: pp. 35-38 *in* Saunders, K. E., Law, M. N., MacKinnon-Burwell, D., Abel, M. J., and Mauriello, M. N. (eds.), Delineation of Erosion Hazard Shorelands, Workshop Summary, Great Lakes Shoreland Management Workshop, June 21-23, 1990, Cleveland, Ohio, 56 p.

- Terpstra, P. D. and Chrzastowski, M. J., 1991, Mathematical trends in the erosional evolution of a logarithmic-spiral bay on the Illinois shore: in Folger, D. W., Colman, S. M., and Barnes, P. W., (eds.), Third Annual Southern Lake Michigan Coastal Erosion Workshop (Abstracts and Program), U. S. Geological Survey Open-File Report 91-284, pp. 47-48.
- Terpstra, P. D., and Chrzastowski, M. J., 1991, Summary of lake bottom changes at North Point Marina vicinity between 1988 and 1990: Program and Abstracts, 34th Conference on Great Lakes Research, International Association for Great Lakes Research, p. 76.
- Terpstra, P. D. and Chrzastowski, M. J., 1992, Geometric trends in the evolution of a small log-spiral embayment on the Illinois shore of Lake Michigan: *Journal of Coastal Research*, v. 8, no. 3, pp. 603-617.
- Terpstra, P. D. and Chrzastowski, M. J., 1992, 1987-1991 beach and nearshore monitoring at a major coastal engineering project on the Illinois shore of Lake Michigan: Geological Society of America, Abstracts with Programs, v. 24, no. 7, p. A118.
- Terpstra, P. D. and Chrzastowski, M. J., 1993, 1987 to 1992 beach and nearshore changes in the vicinity of North Point Marina on the Illinois coast of Lake Michigan: U.S. Geological Survey, CD-ROM product; text, ARC/INFO maps and ARC/INFO profiles (in review).

IX Olson Site Investigations

- Chrzastowski, M. J., Folger, D. W., Polloni, C. F., Pranschke, F. A., and Shabica, C. W., 1990, Geologic setting of the Olson tree site, southern Lake Michigan: Geological Society of America, Abstracts with Programs, v. 22, no. 7, p. A85.
- Chrzastowski, M. J., Pranschke, F. A., and Shabica, C. W., 1990, Discovery and radiocarbon dating of tree stumps in growth position on the floor of southern Lake Michigan: p. 10 *in* Folger, D. W., Colman, S. M., and Barnes, P. W. (eds.), Southern Lake Michigan Coastal Erosion Study Workshop, U.S. Geological Survey Center for Coastal Geology, February 6-7, St. Petersburg, Florida, U.S. Geological Survey Open-File Report 90-272, 25 p.

Chrzastowski, M. J., Pranschke, F. A. and Shabica, C. W., 1991, Discovery and preliminary investigations of the remains of an early Holocene forest on the floor of southern Lake Michigan: *Journal of Great Lakes Research*, v. 17, no. 4, pp. 543-552.

Illinois State Geological Survey, Ancient river channels discovered on floor of southwestern Lake Michigan: Champaign, Illinois ISGS Geonews (Newsletter), Winter, 1991, p. 7.

Pranschke, F. A., Shabica, C. W., and Chrzastowski, M. J., 1990, Discovery of an early Holocene relict forest on the floor of southern Lake Michigan, *Geological Society of America, Abstracts with Programs*, v. 22, no. 5, p. 42.

Pranschke, F. A., Shabica, C. W., and Chrzastowski, M. J., 1990, Early Holocene forest remains on the floor of southern Lake Michigan (Abstract): *Transactions of the Illinois State Academy of Sciences*, 83rd Annual Meeting, October 26-27, 1990, Champaign, Illinois.

X Field Trip Guidebooks

Chrzastowski, M. J., 1991, Coastal geology and coastal Engineering of the Illinois shore of Lake Michigan (Field Trip Guide 6): pp. 6/1-6/41 *in* Killey, M. M. (ed.), *Association of Engineering Geologists, Field Trip Guidebook*, 34th Annual Meeting, Chicago, Illinois.

Collinson, C., Jennings, J. R., Terpstra, P. D., and Hansel, A. K., 1990, Coastal processes and erosion on the Illinois Lake Michigan shore: pp. A1-A38 *in* Hammer, W., and Hess, D. F. (eds.), *Geology Field Guidebook, Current Perspectives on Illinois Basin and Mississippian Arch Geology*: Western Illinois University, Macomb, Illinois, 226 p.

